

## CLAIMS

1. A method of controlling a flow of a fluid which is characterized in that at least a part of a surface of a fluid passage is  
5 comprised of a substance being capable of changing a contact angle of water by irradiation of light and the contact angle of water of the substance for changing a contact angle of water is controlled so as to change the contact angle of water of its surface, thereby controlling a flow of a fluid.

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2. A method of controlling a flow of a fluid in a microchannel which is characterized in that at least a part of a surface of the microchannel is a hydrophilization portion comprised of a substance being capable of decreasing a contact angle of water by  
15 irradiation of light and the hydrophilization portion is irradiated with light to decrease a contact angle of water of the surface thereof.

3. A method of controlling a flow of a fluid in a microchannel in which at least a part of a surface of the microchannel  
20 is a hydrophilization portion comprised of a substance being capable of decreasing a contact angle of water by irradiation of light; said method comprises:

- (1) irradiating the hydrophilization portion with light to decrease a contact angle of water of the surface thereof,
- 25 (2) releasing a substance for increasing a contact angle of water from a material for controlling a contact angle of water which contains the substance for increasing a contact angle of water which provides a

surface having a contact angle of water larger than that of the hydrophilization portion subjected to decreasing of a contact angle of water, and

(3) bringing the released substance for increasing a contact angle of water into contact with the surface of the hydrophilization portion to adhere the substance for increasing a contact angle of water to the surface of the hydrophilization portion, thereby increasing the contact angle of water of the surface.

4. The method of Claim 3, wherein said (3) is followed by (4) irradiation of light on the hydrophilization portion to which the substance for increasing a contact angle of water was adhered, to decrease the contact angle of water on the surface of the hydrophilization portion again.

5. The method of Claim 4, wherein a passage of a fluid in the microchannel is switched alternately by repeating said (2) to (4).

6. The method of any of Claims 1 to 5, wherein the substance being capable of decreasing a contact angle of water by irradiation of light is a substance having a photocatalytic action.

7. The method of any of Claims 1 to 6, wherein the substance being capable of decreasing a contact angle of water by irradiation of light is titanium oxide.

8. The method of any of Claims 3 to 7, wherein means to

release the substance for increasing a contact angle of water from the material for controlling a contact angle of water is irradiation of light or heating.

5                   9. The method of any of Claims 2 to 8, wherein a light source is a laser generator, an ultraviolet lamp or a mercury lamp.

                  10. The method of any of Claims 2 to 9, wherein the method of light irradiation is an irradiation method being capable of changing a  
10 focus in the depth direction.

                  11. The method of any of Claims 3 to 10, wherein the material for controlling a contact angle of water which contains the substance for increasing a contact angle of water comprises the  
15 substance for increasing a contact angle of water alone or is a liquid or solid containing the substance for increasing a contact angle of water.

                  12. The method of any of Claims 3 to 11, wherein the material for controlling a contact angle of water is polydimethylsiloxane  
20 containing the substance for increasing a contact angle of water.

                  13. The method of any of Claims 3 to 12, wherein the substance for increasing a contact angle of water is an organosilicon compound.

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                  14. The method of any of Claims 3 to 13, wherein the portion other than the hydrophilization portion in the microchannel is

made of the material for controlling a contact angle of water which contains the substance for increasing a contact angle of water.

15 15. The method of any of Claims 2 to 14, wherein a hydrophilic portion and a hydrophobic portion are selectively provided by selectively irradiating a specific region of the hydrophilization portion with light through a light-shielding pattern.

10 16. The method of any of Claims 3 to 15, wherein a hydrophilic portion and a hydrophobic portion are selectively provided by selectively applying light or heat on a specific region of the material for controlling a contact angle of water through a shielding pattern.

15 17. A valve provided in a passage of a fluid, wherein a part of an inner wall surface of the passage is comprised of a substance being capable of controlling a contact angle of water by irradiation of light and a fluid resistance in the passage of a fluid is controlled by controlling a contact angle of water of the inner wall surface comprised of the substance being capable of controlling a contact angle of water  
20 so as to differ from a contact angle of water of other inner wall surface.

18. The valve of Claim 17, wherein the substance being capable of controlling a contact angle of water is a substance which is capable of exhibiting both of hydrophilic property and photocatalytic  
25 action.

19. The valve of Claim 18, wherein the substance being

capable of controlling a contact angle of water is titanium oxide.

20. A valve for a microchannel which is provided in the microchannel and has a hydrophobic portion and a hydrophilization  
5 portion, wherein the hydrophobic portion is made of a material for controlling a contact angle of water which can release a substance for increasing a contact angle of water by application of light or heat and the hydrophilization portion is made of a substance being capable of decreasing a contact angle of water by irradiation of light.

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21. The valve of Claim 20, wherein the substance being capable of controlling a contact angle of water is a substance which is capable of exhibiting both of hydrophilic property and photocatalytic action.

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22. The valve of Claim 21, wherein the substance being capable of controlling a contact angle of water is titanium oxide.

23. A micro device having the valve of any of Claims 17 to  
20 22.

24. A microsensor having the valve of any of Claims 17 to  
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